

Claims

- [c1] Integrated process for residual oil supercritical extraction (ROSE), asphaltenes gasification, gas cleaning and combined cycle power generation or gas processing, comprising:
- processing the residual oil with solvent in a ROSE unit having high level heat requirements to recover an asphaltene stream and a deasphalted oil stream;
 - gasifying the asphaltene stream to form a gas stream;
 - cleaning the gas stream to remove ash, soot, sulfur or a combination thereof;
 - supplying the cleaned gas stream to (1) a combined cycle system for generation of power, steam or a combination thereof, (2) a gas processing system to produce hydrogen, synthesis gas, fuel gas, or a combination thereof, or (3) a combination thereof;
 - recovering high level heat from the gas stream from the gasification, from the combined cycle system, or from a combination thereof, to supply the high level heat requirements of the ROSE unit.
- [c2] The process of claim 1 wherein the high level heat re-

covery and ROSE requirements are at temperatures of at least 155°C.

- [c3] The process of claim 2 wherein at least a portion of the high level heat recovery and ROSE requirements use steam at a pressure of at least 0.7 MPa.
- [c4] The process of claim 2 wherein at least a portion of the high-level heat recovery and ROSE requirements use a heat transfer fluid at a pressure below 1 MPa.
- [c5] The process of claim 2 wherein the high-level heat recovery and ROSE requirements use (1) steam at a pressure of at least 0.7 MPa, (2) a heat transfer fluid at a pressure below 1 MPa, or (3) a combination thereof.
- [c6] The process of claim 5 wherein a majority of solvent used in the ROSE unit comprises pentane.
- [c7] The process of claim 6 wherein high level heat is recovered from the gas stream from the gasification using a high-pressure steam boiler and a heat transfer fluid heater, and wherein the heat transfer fluid from the heater is supplied to provide substantially all of the high level heat requirements of the ROSE unit and recirculated to the heater.
- [c8] The process of claim 6 wherein:

high level heat is recovered from the gas stream from the gasification using a first high-pressure steam boiler and a heat transfer fluid heater;
high level heat is recovered from gas turbine exhaust in the combined-cycle system using a second high-pressure steam boiler;
the heat transfer fluid from the heater is supplied to provide from 30 to 70 percent of the high level heat requirements of the ROSE unit and recirculated to the heater; and
steam from the first boiler, the second boiler, or a combination thereof is supplied to provide from 30 to 70 percent of the high level heat requirements of the ROSE unit.

[c9] The process of claim 6 wherein high level heat is recovered from gas turbine exhaust in the combined-cycle system using a high-pressure steam boiler and a heat transfer fluid heater, and wherein the heat transfer fluid from the heater is supplied to provide the high level heat requirements of the ROSE unit and recirculated to the heater.

[c10] The process of claim 6 wherein:
high level heat is recovered from the gas stream from the gasification using a first high-pressure steam boiler;

high level heat is recovered from gas turbine exhaust in the combined cycle system using a second high-pressure steam boiler and a heat transfer fluid heater;

the heat transfer fluid from the heater is supplied to provide from 30 to 70 percent of the high level heat requirements of the ROSE unit and recirculated to the heater; and

steam from the first boiler, the second boiler, or a combination thereof is supplied to satisfy from 30 to 70 percent of the high level heat input to the ROSE unit.

[c11] The process of claim 6 wherein low-pressure steam from the ROSE unit is supplied to heat boiler feed water for the high level heat recovery, to heat fluid in a reboiler for the fuel gas cleaning, or a combination thereof.

[c12] The process of claim 5 wherein a majority of solvent used in the ROSE unit comprises butane.

[c13] The process of claim 12 wherein:
heat is recovered from gas turbine exhaust in the combined-cycle system using a high-pressure steam boiler and from the gas stream from the gasification using a medium-pressure steam boiler;
steam from the high-pressure boiler is supplied to

provide from 30 to 70 percent of the high level heat requirements of the ROSE unit; and
steam from the medium–pressure boiler is supplied to provide from 30 to 70 percent of the high level heat requirements of the ROSE unit.